Medical Library

SEP 1 0 1945

Canadian Journal of PUBLIC HEALTH

The National Journal of Preventive Medicine

Volume 36 AUGUST 1945 Number 8

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PUBLISHED MONTHLY BY THE
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Canadian Journal of
PUBLIC HEALTH

VOLUME 36
NUMBER 8

TORONTO
AUGUST, 1945

The Diphtheria Situation in Montreal and Immunization

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BECAUSE of its seriousness and its high mortality rate, diphtheria has attracted the attention of health authorities in every country. Although great progress has been achieved in reducing mortality rates through serotherapy and immunization, there is always the danger of outbreaks in large communities among children who have not been immunized or who, if immunized, have lost their immunity.

In this study of diphtheria in Montreal I was able to make use of data published in the annual reports of the city from 1875 to date. The older reports, of course, are not so complete as one would wish them to be; nevertheless, it is amazing to see how much information can be gathered from them. Some of these reports classify the number of cases and deaths, not only by wards but even by streets. Tribute is due the health officers of those days who had very little material to work with and were further handicapped by lack of personnel, etc.

In the annual reports from 1875 to 1886, you will find only the number of deaths. From 1887 to 1903, with the exception of 1897 when no report was published, the cases and the deaths were classified in three groups,—diphtheria, croup and diphtheria-croup,—by age-groups of less than one year, from five to twenty years, and from twenty to eighty years in age-groups of 10.

Morbidity

The total number of cases reported from 1887 to 1943 was 41,665. The

Presented at the thirty-third annual meeting of the Canadian Public Health Association, held in the Royal York Hotel, Toronto, November 6-8, 1944.

morbidity in the course of those fifty-six years remained very high until the five-year period 1930-1934 (table I). In the first three-year period for which cases were reported (1887-1889), the incidence rate per 100,000 population was as high as 572.97. Afterwards the rate showed variations and dropped to 67.54 in the period 1930-1934 and then to 22.20 in the period 1935-1939. In the last four years, 1940-1943, the average rate has been 20.6. This great reduction in the attack rate is no doubt the result of immunization, which was started in 1928.

TABLE I

MEAN NUMBER OF CASES REPORTED AND INCIDENCE RATE OF DIPHTHERIA PER 100,000 POPULATION, DURING A THREE-YEAR PERIOD (1887-8-9), FOR FIVE-YEAR PERIODS FROM 1890 TO 1939 WITH THE EXCEPTION OF A FOUR-YEAR PERIOD (1895-96-98-99), AND FOR SINGLE YEARS FROM 1940 TO 1943

Years	Population (mean)	Cases reported	Incidence rate per 100,000 population
1887-1889	193,900	1,111	572.97
1890-1894	221,290	349	157.71
1895-1899	247,300	852	344.52
1900-1904	290,746	455	156.49
1905-1909	387,880	544	140.25
1910-1914	482,037	959	198.95
1915-1919	558,280	1,241	222.29
1920-1924	639,481	1,190	186.09
1925-1929	738,500	1,344	181.99
1930-1934	824,695	557	67.54
1935-1939	869,220	193	22.20
1940	894,600	134	14.98
1941	903,007	193	21.37
1942	926,000	212	22.89
1943	950,600	158	16.62

The fluctuation in case incidence is shown by the occurrence of 1,448 cases in 1887, 1,182 cases in 1888, and 1,128 in 1896. These were the highest rates in the twenty-five-year period 1887-1912, while the average number of cases for the other twenty-two years in the same period was 523. But from 1913 to 1929, with the exception of the years 1924 and 1925, the number of cases each year was well over the 1,000 mark, reaching in 1927 a total of 1,826 cases, which was the highest number of cases of diphtheria for one year in the history of our city.

As to age-groups, from 1887 to 1943, 1,406 cases of diphtheria occurred among infants under one year; 19,615 cases among children 1-4; 13,106 cases among children from 5-9; 3,276 cases among children from 10-14, and 4,263 cases among adults from 15-80. In terms of percentage of total cases, 3.4 per cent occurred in infants; 47.1 per cent in the age-group 1-4; 31.4 per cent in the age-group 5-9; 7.9 per cent in the age-group 10-14, and 10.2 per cent among adults from 15-80.

Mortality

Table II illustrates the number and rates, per 100,000 population, of deaths caused by diphtheria, and the mean for five-year periods from 1875-1939 and by year from 1940-1943. The highest death rate was for the period 1885-

1889, the mean number of deaths being 478, with a rate of 256.5. The two highest death rates known were in 1877 and in 1887, the rates being respectively 359.5 and 346.8. From then on there was a downward trend in the mortality rates, particularly in the last thirteen years, the rates being less than 10 per 100,000 population. The lowest rate so far has been 1.2 in 1940.

We cannot deny that the decrease in the mortality rates was accelerated by the use of serotherapy at the beginning of the 19th century and later on by the introduction of immunization.

TABLE II

NUMBER AND RATES PER 100,000 POPULATION OF DEATHS CAUSED BY DIPHTHERIA, MEAN FOR FIVE-YEAR PERIODS FROM 1875 TO 1939 AND FOR SINGLE YEARS FROM 1940 TO 1943

Years	Population	Number of deaths	Rate per 100,000 population
1875-1879	127,400	237	186.0
1880-1884	149,170	272	182.3
1885-1889	186,340	478	256.5
1890-1894	221,290	165	74.6
1895-1899	247,300	270	109.2
1900-1904	290,746	104	35.8
1905-1909	387,880	106	27.3
1910-1914	482,037	144	29.9
1915-1919	558,280	172	30.8
1920-1924	639,481	157	24.6
1925-1929	738,500	146	19.8
1930-1934	824,695	51	6.2
1935-1939	869,220	22	2.5
1940	894,600	11	1.2
1941	903,007	31	3.4
1942	926,000	26	2.8
1943	950,600	27	2.8

Classifying the total number of deaths occurring in the same period,—1875 to 1939—7.5 per cent were in the age-group of less than one year, 61.5 per cent from 1-4 years, 25.6 per cent from 5-9, 3.1 per cent from 10-14, and 2.3 per cent in the age-group 15-80.

Mortality

In the three-year period from 1887 to 1889, the mortality rate was as high as 45.6 per cent. Since then this rate has shown a downward trend to 9.2 per cent in the five-year period 1930 to 1934. On the other hand, there has been an upward trend in the last nine years, the percentage being 17.1 in 1943.

It is a well-known fact among large communities on this continent and in Europe that the mortality rate always tends to increase as a greater proportion of children become immunized.

Immunization

The history of immunization in Montreal begins in 1922, when a small group were given protective doses of Anatoxine-Ramon in Ste. Justine Hospital by Dr. Gaston Lapierre. In 1924, through the generosity of Lord Atholstan, the Montreal Anti-Tuberculosis and General Health League was formed, operating from 1924 to 1928 under the direction of the late Dr. Grant Fleming.

During this time, in the two health centres of the League, one in an English-speaking and the other in a French-speaking district, a vigorous immunization campaign resulted in awakening the public to the fact that diphtheria was a preventable disease. The Health League, which had been set up for a five-year demonstration period, discontinued its activities in 1928. Its anti-diphtheria work, however, was and still is being carried on by the Child Welfare Association, one of Montreal's pioneer voluntary health agencies, which has been doing immunization since 1926 when the late Dr. A. B. Chandler was medical director of the organization.

In September 1928, the Department of Health commenced immunization in the municipal well-baby clinics. Anatoxine-Ramon was given to children aged from 6 months to 10 years, at first in three doses of 1/2 cc., 1 cc. and 1½ cc.,

TABLE III

NUMBER AND PERCENTAGE OF CHILDREN (BY AGE GROUPS) GIVEN IMMUNIZING AGENT, 1928-1943

Year	Number given immunizing agent as of December 31			Percentage given immunizing agent as of December 31	
	Age group 0-4	Age group 5-9 and over	Total	Age group 0-4	Age group 5-9 and over
1928*	850	617	1,467	57.94	42.06
1929	1,773	2,563	4,336	40.89	59.11
1930	4,680	6,690	11,370	41.16	58.84
1931	4,993	7,216	12,209	40.90	59.10
1932	6,312	8,493	14,805	42.63	57.37
1933	15,328	33,368	48,696	31.48	68.52
1934	7,393	6,926	14,319	51.63	48.37
1935	8,106	7,269	15,375	52.72	47.28
1936	8,209	6,832	15,041	54.58	45.42
1937	8,804	7,195	15,999	55.03	44.97
1938	8,359	5,396	13,755	60.77	39.23
1939	8,667	4,807	13,474	64.32	35.68
1940	8,752	5,101	13,853	63.18	36.82
1941	14,436	7,702	22,138	65.21	34.79
1942	13,496	5,366	18,862	71.55	28.45
1943	14,190	2,649	16,839	84.27	15.73
Total.....	134,348	118,190	252,538	53.2%	46.8%

*For the months of September, October, November and December.

with an interval of three weeks between each injection. During the last few years the method has been simplified to three doses of 1 cc. each.

The Anatoxine is supplied by the Department of Health to practising physicians, to voluntary organizations ("Les gouttes de lait paroissiales," The Child Welfare Association) and to children's institutions ("Les Crèches," etc.), on the condition that they send into the department reports of the immunizations done.

In the beginning, the results were not very encouraging as the parents were hard to convince and they were more inclined to have their older children immunized than the younger ones.

As will be seen from table III, which gives the number of immunizations

done every year and the percentage for the two specified age-groups, in the beginning more children of the age-group 5-9 and over were immunized than of the age-group 0-4. This is most apparent in 1933 when the proportion is almost two-thirds for the first group (5-9) against one-third for the latter group (0-4). From then on, the percentage of children in the age-group 0-4 given an immunizing agent has gradually increased, being 84.2 per cent in 1943. Since 1928, 252,538 children have been immunized.

Although progress has been made in the last ten years in having a greater number of infant and preschool children protected against diphtheria, we find that, for that age-group, the percentage in 1943 is only 55.11 while the percentage for the children of the age-group 5-9 is 75.77 (table IV).

TABLE IV

DIPHTHERIA CASES, CUMULATIVE NUMBER AND PERCENTAGE OF POPULATION (BY AGE GROUPS) GIVEN IMMUNIZING AGENT, 1928-1943

Year	Number diphtheria cases reported	Estimated population		Number given immunizing agent as of December 31		Percentage given immunizing agent as of December 31	
		Age group 0-4	Age group 5-9	Age group 0-4	Age group 5-9	Age group 0-4	Age group 5-9
1928*	1,632	89,059	80,804	850*	488*	0.95*	0.60*
1929	1,254	88,540	82,849	2,465	2,828	2.78	3.41
1930	930	87,798	85,083	6,568	9,039	7.48	10.62
1931	706	87,291	85,965	9,757	16,511	11.18	19.21
1932	607	86,364	87,079	13,276	25,400	15.37	29.17
1933	297	85,437	87,145	24,913	52,428	29.16	60.16
1934	244	84,510	86,600	25,901	54,944	30.65	63.44
1935	183	83,583	86,261	26,776	56,752	32.04	65.79
1936	166	82,656	86,347	27,355	58,117	33.09	67.31
1937	249	81,729	86,447	28,830	59,023	35.28	68.28
1938	222	81,305	86,092	29,749	58,805	36.59	68.30
1939	143	80,905	85,404	31,407	57,266	38.82	67.05
1940	134	79,978	83,086	32,458	56,289	40.58	67.75
1941	193	79,046	80,179	39,545	57,217	50.03	71.36
1942	212	84,052	77,211	44,735	57,592	53.22	74.59
1943	158	89,833	74,714	49,506	56,609	55.11	75.77

*For the months of September, October, November and December.

Schick Test

For children over 10 years of age a pre-Schick test was advised. Out of 27,050 tests made from 1928 to 1935, 34 per cent gave positive Schicks. In the same length of time, out of a total of 84,629 children immunized, 28,155 were tested six months after the administration of toxoid; 26,979 returned for a reading and 26,772 (99.2 per cent) gave a negative reaction. The post-Schick was discontinued in 1935 and the pre-Schick is now done occasionally for children over ten years of age and for a few adults.

Diphtheria cases reported among immunized children

During the past eleven years, 158 confirmed cases of diphtheria had a history of immunization. Of this total, 4 children had been inoculated with alum-precipitated toxoid (one dose) and 154 with Anatoxine-Ramon. Of the

latter, 128 had been given three doses, 10 two doses, and 16 one dose. Actually, only 132 should be considered as having been presumably protected. In the group fully protected, one death occurred four years after immunization. Table V shows the classification of cases by age-groups and by the time elapsed since immunization.

TABLE V

INOCULATION HISTORIES OF CONFIRMED DIPHTHERIA CASES AFTER IMMUNIZATION, 1933-1943

Toxoid used	Confirmed Cases with Inoculation History				
	Anatoxine-Ramon			Alum Precipitated Toxoid	Total cases
	Three doses	Two doses	One dose		
Total	128	10	16	4	158
I—Classified by Age					
Age Groups					
0-2 years	12	0	1	0	13
3-4 years	20	3	3	0	26
5-9 years	68	6	12	4	90
10-14 years	24	1	0	0	25
15 and over	4	0	0	0	4
II—Classified by Time since Inoculation					
Time since Inoculation					
0-3 months	12	6	11	0	29
4-11 months	10	1	1	0	12
1 year	19	1	1	1	22
2 years	17	1	2	0	20
3 years	15	0	0	0	15
4 years	9	0	0	2	11
5 years	19	0	1	0	20
6 and over	27	1	0	1	29

Immunization Campaigns

In the first years of immunization, campaigns were organized in the well-baby clinics and later in the schools. The number of children immunized was increasing every year but was not up to expectations. In 1933, therefore, the Department of Health organized a campaign with the aid of the practising physicians. Articles were published in the newspapers, radio talks were given, letters were sent to the pastors of all churches asking their support, posters were placed in the street cars and stores, a short sound-film prepared by members of the department was shown in all the theatres, and literature was distributed. The result of the campaign was that 48,696 children were immunized. We did not, however, succeed in having the infants and the preschool children protected, since only one-third of the children inoculated belonged to

that age-group. The campaign has been renewed each year. Since 1941 it has coincided with the national campaign sponsored by the Health League of Canada.

Following a local outbreak of diphtheria in 1941, when 40 per cent of all cases and 45 per cent of all deaths occurred in the South-Western Health District, more rigorous quarantine measures were taken against contacts and carriers by administering 10,000 units of serum to each. In order to secure the co-operation of the medical profession, a special visit was made to all the doctors practising in the district to inform them of the situation and of the special measures taken. The pastors of the churches were also interviewed and a letter was given to them with the request that it be read from the pulpit. A house-to-house canvass was conducted in the district by the school visiting-nurses so that an estimate might be made of the percentage of children not yet immunized. This survey showed that only 64.12 per cent of those under 10 years had been protected. Subsequently 4,399 letters were sent to parents, asking them to consult their family physician or to bring their children to the well-baby clinic for inoculation. As a result of the visits and letters, immunization was given to 5,244 (65 per cent) of the 8,423 children not previously protected. The success of this local survey in 1941 was extended to the rest of the city, with the result that 22,138 children were immunized that year and 18,862 in 1942, whereas the average in the three previous years was but 13,500.

In September 1944 the Department of Health began to administer the combined toxoid for diphtheria and whooping-cough immunization. It is still too soon to report results, but the enthusiasm shown by the parents and the numbers of children who have been given doses seem to promise success. Children who have completed the diphtheria-immunization series are being given the combined toxoid, which in addition to affording protection against whooping-cough, serves to protect them further against diphtheria.

If, in the past, the diphtheria situation in Montreal has been very disastrous, it is a consolation for us to realize that it has improved considerably during the last thirteen years. In spite of this improvement, we are still far from solving the problem of preventing diphtheria as long as only 55 per cent of our infants and pre-school children are being protected. It is largely a matter of continuous education of the public; and with the ever-increasing support our efforts are receiving from the practising physicians, we hope that each year will find more and more of our children immunized against diphtheria.

The Bureau of Statistics Prepares for Postwar Problems

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WITH the creation of the Dominion Bureau of Statistics in 1918, the task of bringing into being a national system of statistics for Canada commenced. The objective of the Bureau as a central statistical office was the co-ordination of the statistics of Canada under a single comprehensive scheme and their extension so as to meet the current needs of the country and to follow the probable course of its development. To accomplish this end, many gaps had to be filled in, duplication avoided, uniformity of quality achieved, reports issued more promptly, and a co-ordinated and integrated statistical picture achieved through the organization and direction of a central Bureau.

From 1918 to the outbreak of the present war this objective was sought continuously, and the Bureau had won high repute throughout the world. In fact, its reputation was such that certain other countries borrowed some of its experts to organize their statistical activities. During the war it was called upon to play an important role in supplying statistical data to the various war departments and agencies. Had it not been for the wealth of statistical information available, the task of controlling the Canadian economy for war would have been much more difficult. Scarcely any of the Bureau's twenty-two branches escaped a very heavy demand to meet the special needs of those responsible for directing the war effort.

Now the Bureau must prepare itself for the reconstruction and postwar period. It may be said that it has reached the end of the first stage of its evolution. It was only to be expected that at first the principle of extension should receive most consideration. Many and great gaps had to be bridged. Improvement in quality had often to await a more convenient season. At the outbreak of war the main objectives of coverage had been reached, with only a few gaps remaining. Qualitative improvement now is imperative. Statistical information of the highest quality will be essential as a guide to policy in a post-war world confronted with international problems of great complexity and committed to the principles of high employment and social security. Never before has the need for the most reliable statistics been so great.

To meet this situation the Bureau has been streamlining its organization. In 1944 a Central Planning and Development Staff was created, manned by well-trained economists. If the Bureau is to continue to fulfil its functions as a central statistical organization, it is extremely important that it should have a strong staff group concentrating on the revision and improvement of its statistical output and on the development of statistical information to meet the growing needs of government departments and the general public. The Central Staff will have statistical objectives continually under review. In order to improve

standards it is essential to review, continuously, the needs of consumers of statistics—both within and outside the government—and the extent to which these needs are being met currently. This requires active contact with other government branches and with business associations. It also calls for a periodic review of the work in the various branches of the Bureau.

The task of directing this work from a broader point of view has become much too great for the Dominion Statistician and his assistant, hence a planning and development staff is essential to enable the work of the Bureau to be brought to full fruition. Moreover, there are economic aspects pertaining to the statistics in special fields which are overlooked by the Chief of a Branch who is a specialist working in his own field. These aspects will be taken care of by the Central Staff. Among its tasks will be the development of important new series of economic statistics and the integration and fuller analysis of existing series.

The first task of the Central Staff is a complete reorganization of National Income statistics, and considerable progress has already been made in this field. These statistics have come to occupy a key position during the war, as is evidenced by the creation of a Central Statistical Office in the United Kingdom to develop them. They are indispensable for the formulation of government financial policy. Taxation and the scale of public expenditures, to be properly understood, must have as a background a quantitative record of the total economic activity of the Dominion. National Income statistics are of great importance in war-time and equally indispensable in peace-time. When a government accepts over-riding responsibility for the level of employment, reliability of estimates is even more important when National Income is subject to fluctuations—and not steadily expanding, as in war-time.

An interesting feature of the Central Staff is that its work will be confined largely to research. When new series—or improvements in old ones—have been planned and developed, they will be handed over to the appropriate branch of the Bureau to carry on.

A second development of great promise is the creation of a Sampling Organization. The demands for statistical information are increasing so rapidly that to meet them by the method of complete enumeration would be very costly. Fortunately this is not necessary, because the application of the sampling technique, based on the mathematical theory of probability, makes it possible to secure results with a small margin of error from a sample in many cases as small as one per cent. In its bulletin, "Sampling Procedures and Methods of Operation of the Monthly Report on the Labour Force", the United States Bureau of The Census says of the sampling method: "The speed, accuracy and small cost of gathering information by interviewing scientifically selected samples of the population are just beginning to be appreciated. The sample survey method offers unlimited possibilities."

A quarterly survey of the Labour Force will be the first undertaking of the Sampling Organization. This will furnish an overall picture of unemployment, together with data on employment and other aspects of the Labour Force. It is planned eventually to extend the sampling principle to a number of other statistical fields covered by the Bureau.

The Sampling Organization will have many uses. Some of the sampling now done in the Bureau as an integral part of current statistics can be done on a much more scientific basis, and would thus yield a higher quality of data—as in the case of certain field crops. It can test the accuracy of statistics collected through the decennial census, such as the earnings of wage-earners. Special inquiries could be carried out expeditiously and economically. Sampling investigations for private firms, which cannot be handled by commercial sampling organizations, could be made, such as regional cost-of-living surveys in connection with differential wage rates. The number of questionnaires sent to business firms would be reduced by the application of sampling to fields now covered by complete enumeration.

Many developments are taking place in the various branches of the Bureau. In this article it will be possible only to discuss the most outstanding one—that in the Vital Statistics Branch. This branch, working in close cooperation with the Department of National Health and Welfare, is carrying the load of the increasing need for vital statistics and statistics of health and welfare. The organization of this branch of the Bureau, under the leadership of Mr. J. T. Marshall, has been greatly improved through the creation of a National Council on Vital Statistics and a new agreement with the Provinces involving a more efficient method of recording Vital Statistics data. From July 1, 1945, microfilm records replace written transcripts of births, deaths and marriages. Thus, a photographic copy of the actual certificate becomes the basis for coding and compilation, thereby preventing errors in transcription, saving much correspondence, and speeding up the tabulation of results.

A most important development was the decision to create a National Register of Vital Records—a decision reached through Dominion-Provincial conferences. Initially, the Register is concerned with births. In order to provide a basis for the introduction of the National Register of Vital Records, it was agreed that all registrations of births occurring within the provinces from January 1, 1925, to June 30, 1945, should be photographed forthwith and photographs forwarded to the Dominion Bureau of Statistics. The data on the photographs are then punched on "Hollerith" cards by alphabetical key punches and lists prepared from them in alphabetical order. These lists are then used for the purpose of verifying applications for "Family Allowances". The National Register is to be used by the Dominion and Provincial governments for the purpose of verification and statistics only. Any further use must be approved by each province in respect to its part of the records and the index after recommendation by the National Council of Vital Statistics for Canada. Though the National Register is concerned at present only with births, eventually it will include marriages, divorces, deaths and adoptions. This Register will be of increasing value as new measures for social security develop.

The establishment of a Division of Venereal Disease Control in the Department of Pensions and National Health was accompanied by reorganization in the Vital Statistics Branch of the Bureau, to render the statistical information more adequate for the purpose. This involved the institution of a standard report form to ensure uniformity of reporting, additional information to make

possible more adequate analyses, and the substitution of venereal disease data supplied by Provincial Departments of Health on a weekly communicable disease report, for the monthly reports from venereal disease clinics. In May 1940, the work of analysing weekly reports on communicable diseases was transferred from the Epidemiological Branch of the Department of Pensions and National Health and became again the work of the Vital Statistics Branch of the Bureau. A new section was set up to deal with these statistics. A weekly report is published on the incidence of communicable diseases which has proved helpful in activating control measures. On the recommendation of the Department of National Health and Welfare, and because of the reporting of these diseases on a comparable weekly basis by Provincial departments of health, the incidence of venereal diseases is now included in the report.

It is planned in the near future to further expand the work of the Vital Statistics Branch to include statistics of industrial hygiene, and to resume on a regular basis statistics of sickness in the Civil Service. These data will be used in analytical studies dealing with the problem of reducing absenteeism due to illness.

A Pasteurization Program in British Columbia

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IN January 1944 a pasteurization program was initiated in a health unit in British Columbia. For the purpose of this article the communities concerned are identified as "A", a city of 11,000 population: "B", a town of 6,500; and "C", a town adjacent to "B" with a population of 2,000. At that time there was, from a practical viewpoint, no pasteurized milk available anywhere in the district. In "A" one milk distributor had installed equipment to meet the requirements of a contract for the military authorities but he could not be interested in providing pasteurized milk for his private customers. In addition the operator of a milk-shake bar imported pasteurized milk in bulk from Vancouver and bottled it in "A," retailing a small amount over the counter. Otherwise pasteurized milk was unobtainable. The consensus, moreover, was that it would be impossible to develop a successful pasteurization program in view of the fact that a similar attempt some few years ago had met with complete failure.

In January all milk distributors in the "A" district were invited to attend a meeting in the health unit office to discuss problems of mutual interest. Two days before the meeting we were informed by officials of the milkmen's association that they would refuse to attend the meeting if pasteurization was to be discussed. They were informed that the meeting had been called out of courtesy to the milkmen themselves so that they could hear privately what we had to say. They were told, moreover, that we would discuss pasteurization along with other problems, and they could come to the meeting and hear what we had to say or they could stay away and read about it later in the local paper.

All the milk producers were present at the meeting. A number of points were discussed, including the general lack of essential equipment, e.g., bottle-filling and capping machines; our intention to advocate publicly the pasteurization of milk; our intention to tell the public what we knew about the local situation unless the problems were attacked in a constructive manner; and our willingness, before anyone spent money on pasteurizing equipment, to demonstrate a market for pasteurized milk to the extent of at least 400 quarts a day.

During the discussion, the public health aspects of the problem were stressed, but it was pointed out that it did not matter what the milkmen as individuals thought about pasteurization, since we were certain that before long the public would demand it and someone would provide it. On this basis we kept the discussion from becoming controversial by refusing to argue with them on the merits of pasteurization and by stressing the importance, from the milkmen's viewpoint, of the economic aspect of the problem. Their interest was aroused when the obvious wastes in the existing methods of handling and distribution were pointed out, and our suggestion that the group provide a central pasteurization plant on a company or co-operative basis met with some support. The meeting finally was adjourned to give time for further thought on the various

problems, with the agreement that in the meantime no publicity would be given to the matters under discussion.

Further meetings were held and the question of savings by co-operative action and costs of pasteurizing equipment were gone into in detail. In "A" at our first meeting we had interested the local creamery officials in the pasteurized milk business, and the possibility of competition arising between the creamery and the milk distributors was very helpful in speeding a decision. Nine of the fourteen milk distributors finally told us that if we could prove a market for pasteurized milk they would form a co-operative and install pasteurizing equipment.

The next step was to take the matter up with the public and influence it in favour of pasteurization without arousing antagonisms. We knew that many people who had opposed pasteurization before would be ready to fight again at the first opportunity. The general policy, therefore, was developed to make the program as non-contentious as possible in so far as the general public was concerned and if possible to disarm our opponents. Accordingly the following points were continually stressed:

(1) Freedom of choice. We had no intention of forcing pasteurized milk on those persons who insisted on using raw milk, but we felt that the public would agree that those people who wanted pasteurized milk should also have a right to obtain that kind of milk, especially if there was enough demand for it to justify its provision economically.

(2) Pasteurization—what it is and what it does to safeguard milk. It was found that few people actually knew anything about it.

(3) The promise of the health authorities to supervise all milk supplies and require the highest standard for all milk going into pasteurizers.

(4) The plan of the milk distributors to form a co-operative milk distributing business.

(5) The responsibility of those persons wanting pasteurized milk to assist in obtaining it by subscribing to it in writing, stating the actual amount required.

All members of the staff took part in the program to obtain our minimum requirement of 400 quarts of pasteurized milk a day. Information concerning the most important features of the program was sent to the various organizations in the community and arrangements were made to discuss the program with the various service clubs, the boards of trade, the school teachers, the school children, and in fact any meeting where a hearing could be obtained. The organizations were asked to endorse the principle of "freedom of choice" and the provision of pasteurized milk for those who wanted it. In many instances this policy was endorsed publicly by persons who stated at the same time that they themselves intended to continue using raw milk. In a number of other instances, opponents of pasteurized milk were ruled out of order when they attempted to start an argument on pasteurization, on the ground that the point under discussion was essentially one of "freedom of choice" and not pasteurization itself. With this same point as a background, much potential opposition was kept silent by anticipating it with the reminder that opposition to the plan would betray a "dog-in-the-manger" attitude. When the question of "compulsory pasteurization" was raised, as was frequently the case, it was pointed

out that what people really had to fear was a continuation of the existing policy which was to all intents and purposes one of "compulsory raw milk".

In all their contacts, members of the staff made a point of providing information on a constructive basis. Where individuals were found to be definitely opposed to pasteurization they were left alone and given no opportunity to argue about their views. In order to avoid publication of uncontrolled inflammatory articles or "letters to the editor", no attempt was made to use the local daily newspaper to publicize the program until its success was assured. At what was considered to be the proper time—that is, when the general public was already familiar with the various points in our policy—newspaper reports dealing with the pasteurization campaign were both helpful and satisfactory.

Forms for subscribing to the sale of pasteurized milk were distributed at all meetings, through the schools, at clinics, and in the course of home visits. In less than three weeks from the start of the program, signed subscriptions were collected for more than one thousand quarts of pasteurized milk a day. The market for this product having been demonstrated successfully, further campaigning was considered to be unnecessary, especially in view of the fact that it would be some months before the equipment could be placed in operation. Actual processing and distribution of pasteurized milk through the newly formed milk distributors' co-operative association was begun early in January 1945, with the sale of pasteurized milk already representing some 90 per cent of the total output of the plant, an amount far above that for which subscriptions had been received. In addition, the distributor mentioned earlier as having provided the military authorities with pasteurized milk, now processes, according to recent figures, approximately 65 per cent of the milk which he sells to his private customers, and two of the three remaining independent distributors are known to be handling a certain amount of pasteurized milk, presumably in order to meet the requirements of their customers. All told, in the City of "A", where pasteurized milk was virtually unobtainable 8 months ago, approximately 75 per cent of all milk distributed and 100 per cent of that handled by hotels and restaurants is now pasteurized.

The town of "B" entered the health unit in March, 1944 and the first meeting with the milk distributors in the "B"—"C" district was held in May. The discussions with this group were developed along the same lines as those which had been adopted earlier in "A". In the months following the first meeting, further talks were held but the milk distributors, while viewing the recommendations with favour, found it difficult to commit themselves to any specific action. Finally it was decided to force the issue by demonstrating, as in "A," a favourable market for pasteurized milk and to this end an intensive campaign was carried out by the health unit staff during the last two weeks of November. In this program we included the town of "C", anticipating its entrance into the health unit at a later date. For the most part, the public health nurse in that community handled the program there. Incidentally, the town of "C" not only supported the pasteurization program but later, in December, voted in favour of entering the unit.

The plan of campaign adopted in the "B"—"C" district was essentially the

same as that followed in "A". Again information concerning the policy was spread through the various organizations, schools, clinics, and in this instance through the press. The "B"—"C" district is served by a weekly newspaper and after the program had been started satisfactorily, one issue of this paper was used to great advantage in providing information for the general public concerning our policy and the need for pasteurization of milk. The campaign was practically completed before anyone had an opportunity to oppose it through the local paper. Actually, little opposition was encountered in this district in spite of the dour predictions of those who "knew better" when the program was first discussed. By the first of December, subscriptions for pasteurized milk amounted to over 1400 quarts a day, an amount more than sufficient to demonstrate a suitable market for this product.

Following this demonstration of public opinion, the milk distributors became much more active and in February, 1945, plans were completed to form a co-operative and provide pasteurized milk for these communities. The intervention of outside interests no doubt sped the completion of these arrangements and appears to have been the deciding factor in bringing a number of the local milk distributors together.

In this district one pasteurizing plant is now in operation, supplying about half the milk requirements of the community. The demand of the customers of this plant for raw milk has been found to be so small that the operators recently felt justified in discontinuing the sale. A second pasteurizing plant is now about to open and it is anticipated that the great bulk of its business also will be in pasteurized milk.

In addition to the communities already referred to, arrangements have now been completed for the construction of a modern milk pasteurization plant in the "D" district. This is a relatively small rural district served by three villages. It is, however, the centre of a large tourist trade and during the summer months the population is approximately doubled. The district, moreover, is strategically located between the communities of "A" and "B"—"C", and will now be in a position to meet the milk shortages which have occurred in these districts and which formerly were met by purchases of milk from more remote parts. One hundred per cent of the milk distributors in the "D" district have finally subscribed to a co-operative plan in spite of the fact that at one stage in the proceedings they as a group failed to attend one of the meetings arranged for discussion of the whole problem.

The town of "E" is now the only one of the five communities or districts included in the health unit in which the milk distributors have not as a group provided pasteurized milk for their customers. Nevertheless, discussions which have already taken place and spread of information throughout the health unit have not been without effect since one distributor in "E" is now handling pasteurized milk processed elsewhere, for the benefit of the increasing number of people demanding it. It is anticipated that further progress will be made in this community during the coming months.

The pasteurization program as carried out in the communities has included, as pointed out above, milk sanitation; and there has been a very marked improve-

ment in the cleanliness of milk produced and distributed in this area. This has been accomplished without putting milkmen out of business. Education, co-operation and a display of firmness coupled with publicity in one particular instance have resulted in a very satisfactory understanding of the rights of the community on the part of all concerned. Milk counts rarely are higher than 5000 and as a rule run around 2000. Much of the credit for this highly satisfactory situation belongs to Mr. E. J. Kidson, sanitary inspector on the health unit staff.

Summary

This report deals with a pasteurization program which was carried out in a health unit in British Columbia in which formerly no pasteurized milk was available for the general public. The program as carried out so far has resulted in the organization of milk distributors' co-operative associations with the provision of clean milk supplies and pasteurized milk in four of the five communities or districts comprising the unit.

The Production of Phase I Pertussis Vaccine in Casein Hydrolysate Broth

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FOLLOWING the publication by Hornibrook in 1939 (1) of a method for the cultivation of Phase I *H. pertussis* in casein hydrolysate broth, an attempt was made to adapt this procedure to the production of pertussis vaccine on a large scale. This necessitated the introduction of minor changes in the medium originally described by Hornibrook. The essential details of preparation follow:

The preparation of the casein hydrolysate

Five hundred grams of powdered commercial (Meredith-Simmons, Toronto) casein (30 mesh) is added slowly to 400 cc. of concentrated sulphuric acid in 1600 cc. of distilled water. The mixture is brought to boiling point and boiled under a reflux condenser for 36 hours. The sulphuric acid is removed by precipitation in a 20-litre bottle by the addition of a hot solution of 2240 grams barium hydroxide C. P., in 7-8 litres of distilled water. The precipitate is allowed to settle overnight, the supernatant syphoned off and the remainder centrifugalized. The hydrolysate is filtered through Whatman's No. 1 filter paper, chloroform added as a preservative, and the material stored in the refrigerator. The factor of grams of casein per cc. of hydrolysate is calculated on the basis of the total volume of hydrolysate obtained.

The growth factor and glutathione solutions

A liver extract preparation supplied through the courtesy of Dr. E. W. McHenry of the Connaught Laboratories is substituted for the yeast extract recommended by Hornibrook. The source of organic sulphur is 0.1 per cent glutathione sterilized by filtration through a Seitz E.K. film.

The preparation of the medium

Casein hydrolysate from	50.0 g. of casein
Sodium chloride	25.0 g.
Calcium chloride (anhydrous)	0.01 g.
Magnesium chloride (8 H_2O)	0.125 g.
Potassium chloride	1.0 g.
Dipotassium hydrogen phosphate	1.25 g.
Sodium carbonate (anhydrous)	2.0 g.
Soluble starch (Analar B.D.H.)	5.0 g.
Distilled water to 5.0 litres	

In order to avoid precipitation of certain insoluble compounds, the casein hydrolysate and the chlorides are dissolved in about 4 litres of water. The carbonate and phosphate are added in 500-600 cc. of water and the medium observed closely for the formation of a precipitate. If none forms, the starch is

added last, the volume made up to 5.0 litres and the pH adjusted to 6.8-7.0. The pH rises about 0.2 during autoclaving and, since a final pH of 7.0 is desired, the initial pH must be 6.8±. The medium is dispensed into Povitzky diphtheria toxin bottles, 500 cc. to each bottle, and autoclaved at 15 lbs. for 30 minutes.

After the medium has been autoclaved, it may show a faint turbidity but this is not marked. To each 500 cc. quantity, 0.2 cc. of liver extract (McHenry) and 5.0 cc. of an 0.1 per cent solution of sterile glutathione solution are added aseptically and the bottles incubated for 24-48 hours to ensure sterility.

The cultivation of (Phase I) H. pertussis in fluid medium

Cultures may be started in fluid medium by cultivating directly from cultures which have been frozen and dried in sheep's blood and stored in evacuated ampoules (4), or by transferring growth directly from Bordet-Gengou medium (B.-G. medium).

The fluid medium is prepared for this purpose in 5.0 or 10.0 cc. quantities in test tubes. One or two pellets of dried culture are dispensed aseptically into each tube of broth, the tubes are shaken until the contents are dispersed, sloped and incubated at 37°C., allowing as much surface to the air as possible. If the culture is started on B.-G. medium, sufficient of the growth is transferred to each tube to give a distinct turbidity.

After 48 hours' incubation, a loopful of culture from each tube is streaked on B.-G. medium and on 10 per cent blood agar, and a loopful is placed on a microscopic slide, stained by the Gram method and examined microscopically. The plates are incubated for 48 to 72 hours and the growth from the B.-G. plate is examined microscopically. There should be none but the faintest film of growth on 10 per cent blood agar, which is occasioned by the transfer of nutrient materials from the broth. It is frequently absent altogether but if present does not survive on further subculture to 10 per cent blood agar. As the culture begins to show changes in phase characteristics, the growth on plain blood agar tends to become more luxuriant and survive further subculture. If this occurs, the cultures are discarded.

After 4 or 5 days' incubation, if the cultures in the tubes are known to be pure and if the growth is luxuriant, the entire contents of each tube is transferred to a 25 cc. volume of medium in a flask, incubated and re-examined at 48 hours as outlined above. After four or five days' incubation, the contents of each flask is transferred to a 100 cc. volume of medium in a flask, incubated and examined as above. Each 100 cc. volume may be used as inoculum for one 500 cc. volume in the large toxin bottles.

Once the culture has been cultivated successfully in a toxin bottle and examined as outlined above, the contents may be used as an inoculum for 5 or 6 toxin bottles, the culture being transferred aseptically by means of a sterile dispensing apparatus.

The preparation and standardization of the vaccine

Cultures that show luxuriant growth in the large toxin bottles may be pooled for vaccine, provided the following criteria are met:

1. The previous subculture or the current culture must have shown pure phase I characteristics by agglutination.
2. The macroscopic and microscopic examination of the plates seeded from each bottle after 48 hours' incubation must give satisfactory evidence of purity and phase.
3. A 10 cc. sample removed from a bottle of each strain under cultivation must show a satisfactory density, which in this laboratory demands a count of 15,000 million per cubic centimetre or heavier.

The cultures are pooled in large containers so that each lot contains at least 4 strains. Phenol is added to a concentration of 0.5 per cent and the bulk material is set aside in the refrigerator pending standardization, sterility and toxicity tests.

Routine sterility tests are carried out including the following media:

1. Sterility broth in Smith fermentation tubes.
2. Tubes of thioglycollate containing gas capsules.
3. Sterility broth in plain test tubes.
4. Bordet agar and 10 per cent sheep blood agar plates.

In addition to these sterility tests, the sediment from a centrifuged sample of the vaccine is examined microscopically by the Gram method for contaminants. Toxicity tests are carried out by the injection of 2 cc. of every lot intraperitoneally in each of two guinea pigs.

The sterility tests are read at 72 hours for the solid media and 14 days for fluid media. Toxicity tests require that both guinea pigs injected with the sample of each lot of vaccine be alive at the end of 7 days.

Animal Tests

Certain strains of *H. pertussis* have maintained their phase I characteristics for as many as 21 subcultures, while others have shown changes in phase characteristics as early as the 16th subculture. In addition to the control exercised over these cultures as outlined above, certain other procedures have been carried out experimentally in order to determine the immunological properties of cultures after many transfers.

The Virulence Test

This procedure was carried out according to the method outlined by Silverthorne (3). A 48-hour culture, adjusted to a density of "Gates" 0.7 cm., is suspended in 5 per cent hog's gastric mucin to a dilution of 1/10 and, if desired, 1/100, to determine the lethal power. One cc. is injected intraperitoneally into each of a group of at least three mice. The following are representative experiments:

Culture "M" after isolation was carried for 2 subcultures on B.-G. medium and then in fluid medium. Virulence tests were performed after 4, 7, 11 and 22 subcultures in fluid medium. Culture "W" was carried for 14 subcultures on Bordet blood agar, and 12 in fluid medium before testing for virulence.

For comparison, a virulence test was performed with Phase I *H. pertussis* Strain D carried for 6 subcultures on B.-G. medium.

The results of these tests show that virulence was maintained in fluid medium for at least 22 subcultures, as 5 of 5 mice died after receiving the 1/10 dilution and 1 of 5 after receiving the 1/100 dilution. This compares favourably with the virulence of strain D from B.-G. medium in which 4 of 5 and 2 of 5 died after receiving the 1/10 and 1/100 dilution respectively.

The Active Immunization of Mice with Pertussis Vaccine

Vaccines have been prepared from cultures maintained for various numbers of subcultures in fluid medium. Mice were immunized with these and with vaccines prepared on B.-G. medium by the subcutaneous injection of 0.1 cc. of vaccine weekly for 4 weeks, and 7 days after the last dose a killing dose of culture was given according to the method outlined by Silverthorne (3, 4, 5, 6). Representative results are shown in the table.

Immunity Induced in Mice by Vaccines Made from *H. pertussis* Subcultured in Fluid Medium

Strains of Vaccine*	Vaccine prepared from subculture in fluid medium						Controls	
	5th	6th	10th	15th	19th	21st	Vaccine from Bordet-Gengou Medium	No. Vaccine
	Mice surviving/mice injected							
H	14/18	..	15/18	9/16	..	15/17	9/18	2/10
M	..	10/10	..	9/10	..	..	7/10	0/8
M	..	13/18	..	..	16/17	..	14/17	0/10

*Four doses of 0.1 cc. vaccine (15,000 million per cc.) at weekly intervals.

As may be seen in the table, good evidence of protection was obtained with all vaccines prepared from cultures grown in the fluid medium. Although no statistical analysis is possible, in no instance has a vaccine prepared from culture grown in the fluid medium and controlled in the manner outlined above shown less protective power than vaccines prepared from B.-G. medium and tested at the same time. Even after 21 subcultures in fluid medium, cultures which showed no tendency toward change of phase have yielded vaccines with adequate protecting power for mice as judged by this test. In practice, however, it has been deemed advisable to exclude from vaccine cultures beyond the 15th transfer.

The stability to heat of such vaccines was tested in this way also. Portions of vaccine prepared from the 10th subculture in the fluid medium were heated for 30 minutes at 62.5°C., at 100°C., and in steam at 15 lbs. pressure respectively. These samples together with the unheated parent vaccine and vaccine prepared from culture on B.-G. medium were used to inject groups of mice according to the schedule described above. When these groups of mice were injected with a

dose of culture in mucin which killed all of 10 unvaccinated mice, it was found that the antigenic potency had been materially decreased by heating. In one of 2 substantially similar experiments, 18 of 20 mice, which had been immunized with unheated vaccine prepared from fluid medium, survived, as did 10 of 20 which had received B.-G. medium vaccine. Of 19 mice which received fluid medium vaccine heated at 62.5°C. 15 survived. Of the groups which received the vaccine heated at 100°C. and at 15 lbs. pressure of steam, only 4 of 20 and 3 of 19 respectively, survived. The results with vaccine heated at 100°C. differ from those of Ioffe and Hay (3) and Silverthorne (6). It should be observed, however, that in the tests described above, protection by B.-G. vaccine itself was not complete. Experience with this test, in which the method of preparing the killing dose does not allow a very precise interpretation of the results, would suggest that a heavier dose of culture had been administered. This interpretation seems more reasonable than to suggest that the fluid medium vaccine when freshly prepared confers better protection than the standard B.-G. vaccine but is less stable toward heat.

Discussion

Although the production of pertussis vaccine under the conditions outlined has not been without difficulties, it has made possible the preparation of vaccine on a scale not readily obtainable by the method of surface growth on Bordet-Gengou medium. Publication on these grounds would seem justifiable. It must be emphasized, however, that unexplained failures have occurred from time to time. Because of the many variable factors concerned, progress in improving the medium has been slow and often disappointing. Evidently the nutritional requirements are not being fully met, because the cultures differ in the ease with which they may be cultivated in fluid medium and because variations in the density of growth occur from time to time. This difficulty may in part be overcome by the use of large inocula. Unexplained changes in phase have also been encountered with some strains. Moreover, the physical characteristics of the finished vaccine leave much to be desired from the point of view of suspendability. The tendency to form clumps is much more marked than with vaccine prepared from B.-G. medium. On the other hand, the antigenicity of this vaccine, as judged by laboratory methods including the mouse-protection test, compares favourably with that of vaccine prepared from B.-G. medium, and the practical value of the method in general outweighs other considerations.

Summary

1. A method is outlined for the economical production of phase I *H. pertussis* vaccine in fluid medium modified from Hornibrook's original formula to facilitate the handling of large quantities. Modifications have been made in the salt content, and a liver extract is used as a growth factor in place of yeast extract.

2. Strains of *H. pertussis* cultivated in this medium have retained their phase I characteristics as tested by agglutination and virulence for mice, for at least 20 subcultures.

3. The antigenicity of vaccines as measured by mouse protection has been maintained for at least 20 subcultures in the fluid medium described.

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Notes on the Production of Phase I Pertussis Vaccine in Fluid Medium

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AS is pointed out by Wilson in the report above, the production of Phase I pertussis vaccine in fluid medium entails certain difficulties. In the course of the past three years, some of these have been overcome and an outline of suitable modifications in his procedure seems in order. In addition to changes in the routine he describes, observations from experimental work are included here, as indicating possible lines of development.

1. *Basic medium.* Calcium chloride has been omitted as being either unnecessary or inhibitory to growth of certain strains under the conditions described. It has been found advisable to use only casein hydrolysate prepared as above, because several commercial preparations have proved unsuitable at different times. Experimentally, a simplified basic solution has proved entirely satisfactory: casein hydrolysate equivalent to 1 per cent casein; potassium chloride 0.02 per cent; sodium chloride, 0.5 per cent; l-cystine, 0.0012 per cent; sodium dihydrogen phosphate dihydrate, 0.04 per cent; soluble starch, 0.1 per cent; sodium hydroxide to adjust to pH 7.1.

2. *Accessory growth factors.* In routine production, McLeod's liver extract (2) has been substituted for that mentioned above. This material, added aseptically with the glutathione to give 2 per cent concentration by volume, has supplied the necessary growth factor for all strains of *H. pertussis* so far encountered. Experimentally, many strains have required, in addition to a source of sulphur, only nicotinic acid (0.0001 per cent), which may be added to the basic solution before sterilization. Other strains have grown to the required density of 15,000 million per cc. only when thiamin chloride (0.0001 per cent) has been added also, but growth of some strains has been inhibited by thiamin chloride in this concentration. Still another group failed to show satisfactory growth without the addition of factors supplied by the liver extract. Consequently, it has so far not seemed advisable to replace the liver extract with known substances for routine production of vaccine.

3. *Agitation.* Under the conditions described, growth to the required density has not regularly occurred in less than 4-5 days without agitation. With constant agitation, the culture may be harvested in 3 days with great regularity.

4. *Inoculum.* With the changes in routine which have been described, a small inoculum scraped from Bordet-Gengou medium may be used. In general, about 15,000 million cells suspended in 1 cc. of the basic solution suffice for 750 cc. of medium.

5. *Physical properties.* The tendency to form clumps or strings of cultures of *H. pertussis* grown in the modified-Hornibrook medium described by Wilson was an objectionable feature of this vaccine. The tendency was obviated by the addition of 0.075 per cent formalin, an amount which trial showed to be adequate without leaving sufficient free formaldehyde to cause pain on injection.

6. *Toxicity.* Empirically, it was found that the vaccine was detoxified after 1 month at room temperature. As a test of toxicity, 3 guinea pigs and 5 mice are injected intraperitoneally with 2 cc. and 0.5 cc. of vaccine respectively.

7. *Antigenicity.* In addition to the culture and agglutination tests for control of phase which are described by Wilson and which are carried out on every planting, pooled lots of 75-100 litres of vaccine are tested by the mouse-mucin method. This test is performed similarly to the technique of Holm (1) which is modified from that of Silverthorne. For each lot of vaccine, 4 groups of 10 mice weighing 15-18 g. are given 4 subcutaneous doses, at intervals of 3, 7 and 7 days, of vaccine totalling 3.5, 7, 14 and 21 billion cells for the several groups. Ten days after the fourth dose, a suspension in 1 cc. of mucin of 3 billion cells of strain 934* is given intraperitoneally to the vaccinated and to 10 normal mice. Groups of 5 control mice given graded doses of the living culture show that in general this dose of 3 billion is about 3 average lethal doses. Vaccines are released if this test shows the end point of 50 per cent mortality (3) to be 14 billion or less.

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*Obtained through the courtesy of Dr. A. Holm, E. R. Squibb & Sons, New Brunswick, New Jersey.

Scarlet Fever Immunization in Edmonton, Alberta

A Further Study

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THE incidence of scarlet fever amongst a group of public school children in our city, who had been immunized against this disease during the school term of 1936-37, has been previously reported.[1] This was compared with the incidence amongst the children who refused immunization. The above-mentioned report was made two years following immunization, and distribution of cases of scarlet fever in the two groups is indicated in the following table:

	No. in Group	*Cases*	*Rate per 1,000*
Immunized	6,982	29	4.1
Non-immunized	8,063	418	51.8

Seven years now have passed since this immunization was carried out, and the ages of these children at the present time lie generally between 13 and 21 years.

The following table is the result of further study of the incidence of scarlet fever in the two groups, and shows the total number of cases developing in each group during the seven-year period ending December 31, 1944:

	No. in Group	*Cases*	*Rate per 1,000*
Immunized	6,982	63	9.0
Non-immunized	8,063	915	113.4

The number of cases developing in each group during the last five years was only slightly greater than the number *developing* during the first two years of observation.

The ratio of case-rates in the two groups remained constant, the seven-year total still showing the rate in the non-immunized group as 12.6 times that in the immunized.

It should be borne in mind that the immunized group received the five usual doses of scarlet fever toxin, but that no subsequent Dick test was done to insure that immunization had been carried to the point of a negative skin reaction in each child.

The status of scarlet fever immunization has changed little during recent years. No doubt this is due, in great part, to the fact that the energies of the profession have been directed chiefly to more immediately urgent problems during the past five years. Some physicians have been critical of the procedure on the grounds of failure to immunize, reactions from the immunizing toxin, and the claim that immunization increases the number of children with scarlet fever but without rash, who are therefore not brought under control.

These statements generally are based on impression rather than statistical evidence. They give us little information as to the value of scarlet fever im-

[1] *Canad. Pub. Health J.*, 1939, *30*: 488.

munization, since those escaping the disease by reason of having had the toxin are not presented for comparison in such casual observation.

It is true that numbers of individuals fail to develop a full immunity after five doses of scarlet fever toxin. This is not surprising when one thinks of the number of cases who develop a second attack of scarlet fever within a few years, or even months, of a first attack. The same thing is true, to a lesser extent, of immunization against diphtheria. This objection attains importance only if we can show that the failures are so numerous that the procedure has no very useful effect upon the incidence of scarlet fever. I do not think this has yet been shown.

I cannot agree that any considerable percentage of children give a troublesome reaction to the scarlet fever toxin as supplied by the Connaught Laboratories. Such reactions may be largely eliminated by care in administration and by applying careful judgment in gauging each subsequent dose.

I believe that numbers of adults may become infected by the organisms of scarlet fever without developing a scarlet fever rash. Little evidence has been presented, however, to indicate that this infection without rash is common in children with or without immunization. It appears probable that we have many carriers amongst the older group in the community when scarlet fever is prevalent, but it is unlikely that children having scarlet fever without a rash contribute greatly to this group. Lack of proper care in scarlet fever increases the incidence of such complications as nephritis, middle-ear infection and adenitis. If many cases occurred without rash, and thereby escaped diagnosis, we would expect a marked number of complications amongst them. Such complications, with a history of sore throat, etc., would surely bring many of these to our attention as scarlet fever suspects when this disease is prevalent in the community. This, however, is not of common occurrence.

We must agree that our present immunization against scarlet fever is still a cumbersome and costly procedure for community-wide application. We look forward hopefully to improvement in this antigen. The evidence available at this time suggests that if we could obtain even present antigenic values in two or three doses of the toxin we would have a fairly satisfactory preventive.

I have found it impossible to obtain information regarding the further experience of those branches of the armed forces who carried out some immunization against scarlet fever. The subsequent history of those receiving immunization in these groups may be of interest when viewed comparatively with others in the forces receiving no protection. Their general experience as related to the Dick test, however, must be viewed with reserve. As this is one of the most difficult skin reactions to assess accurately, it would be unreasonable to expect that large numbers of medical officers unfamiliar with the test would give consistent results from its use.

I am well aware of the several serious shortcomings in our present immunization against scarlet fever; but even a cursory review of the literature indicates much value in this procedure. My interest in presenting a further grain of evidence lies in the hope that public health workers, at least, will retain an open mind toward the problem, and will continue to gather such information

as is possible until we may reach a reasonably sure judgment. It cannot be expected that the medical profession generally will accept any such procedure without conclusive evidence. You may recall that twenty years ago many practitioners were busy pooh-poohing immunization against diphtheria with diphtheria toxoid—until the public health workers proved its value by showing widespread reduction of diphtheria from its use.

In the meantime, realization that scarlet fever, despite its present usual mildness, remains a widespread economic as well as health problem to our people, will—I hope—encourage research workers to continue their quest for a still more effective antigen.

The Dental Service of the Lamont Health District, Alberta

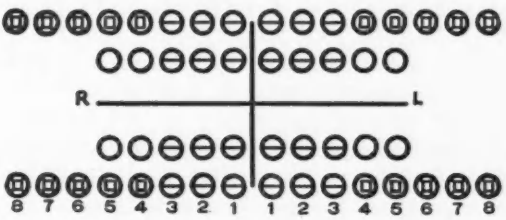
YACHIYO YONEYAMA, D.D.S.

THE importance of dental care for the school children in the Lamont Health District was pointed out to the Board members of the School Division by their Medical Officer, and through their combined efforts a dental service was instituted in February 1943. The plan was such that all school children—public, intermediate, and high—would receive dental care. In an area of 970 square miles there are 66 schools with a population of approximately 3300 school children.

The card reproduced below was devised to record the finding in the individual children and the treatment given. Both the deciduous and the permanent dentition are shown. The card is large enough so that the information desired may be recorded without crowding, and has provision on its reverse side for the details. As only one card is made out for each child, the filing of records alphabetically by school districts is simplified.

Name S.D. Date

Birthday Parent P.O.



DENTAL RECORD CARD, LAMONT HEALTH DISTRICT

Date	Operation	Value

DENTAL RECORD CARD—REVERSE SIDE

Because the area of the District is so widespread, it is divided into three sections for the purposes of the dental service, and the only available dentist spends approximately four months in each centre.

For the survey work, the dentist and her assistant call at a school and examine and record the findings in every child. The following symbols are used to record the data on the cards:

- Tooth previously extracted.

- Tooth to be extracted.

- Cavity to be filled.

- Tooth fractured.

- Treatment required is doubtful.

- Tooth previously filled, but a new cavity has developed.

The symbols indicating defects are marked in blue. As the corrections are made, the same symbols are superimposed in red. By the use of this system (which is not original) the oral condition of each child is seen at a glance.

Because of the large amount of work required, it was decided that two days of treatment service should be given to every one of the 125 school rooms each year, and that the operative work should be limited to extractions, amalgams, and synthetic porcelain fillings. Prophylactic treatment and other work are kept to a minimum.

Appointment cards stating the dates on which the child should come for service are sent to the teachers. The children, especially those in the primary grades, are urged to bring their parents. Despite the distance and the difficulties of transportation, the pupils are prompt in keeping their appointments.

Our findings in the survey work on 2,928 children examined in the first year of the operation of the dental service were as follows:

Year	Number of children examined	Number of caries-free children	Number of defective teeth
1943	2,928	471	8,484

Eighty-four per cent of the children, therefore, had defective teeth, and each child had, on the average, 2.8 defective teeth at the time of examination. (The term "caries-free" refers not only to children normally free from caries but also to those free from caries because of previous corrections.) Of the 8,484 defective teeth, more than half were six-year molars, teeth that cannot be readily spared.

During the first year of operation, 1,019 teeth were extracted and 1,018 teeth were filled; that is, 2,037 corrections were made for the 8,484 teeth found to be defective. The 1,019 extractions represented approximately half of those required and the 1,018 fillings were only one-sixth of those needed.

The figures below show our findings in the survey work on 2,325 children examined in the second year:

Year	Number of children examined	Number of caries-free children	Number of defective teeth
1944	2,325	620	4,604

Thus 74 per cent of the children had defective teeth, and it was found that each child had an average of 1.9 teeth requiring correction. During the second year of operation, 686 extractions and 1,738 fillings—a total of 2,424 corrections—were made for the 4,604 teeth found to be defective. At the time of examination we noted also that corrections had been made other than through this dental service.

Since the group and the number of children examined during the second year of operation were not entirely the same as in the first year, a fair comparison of the figures is not possible. However, it is of interest to observe them:

Year	Number of children examined	Number of caries-free children	Number of defective teeth	Number of fillings done
1943	2,989	8,484	1,019	1,018
1944	2,325	4,604	686	1,738

In the second year of operation there was a decided decrease in the number of extractions. It is apparent, however, that an enormous amount of work is still required before the maintenance of dental health will be established.

During the past two years a number of interesting facts have been observed. The people are not sufficiently aware of the importance of good dental health; the majority simply "did not know that six-year molars are permanent teeth." On the whole, boys have better teeth than do girls, and good teeth run in families. Children in the rural districts have better teeth than children in the villages, except where dentists have been located, and children in some school districts have better teeth than in other districts.

On the basis of observations and findings during the past two years, the Dental Service recommends for the Lamont Health District:

1. More dental health education for all people, thus bringing to their attention the importance of the prevention and control of dental caries.
2. The provision of better equipment.
3. Extension of the service to include pre-school children, thus decreasing the need for it later.
4. An increase in the dental service staff.

Canadian Journal of Public Health

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THE DOMINION GOVERNMENT'S PROPOSALS FOR POST-WAR RECONSTRUCTION

AT the Dominion Provincial Conference, held in Ottawa August 7th to 10th, the Dominion Government presented its extensive plans for reconstruction, a comprehensive program designed to promote full employment, a high standard of living, and social security for all. If the Provincial Governments withdraw from the fields of personal income tax, corporation tax and succession duty revenue, the Federal Government is prepared to assume the following financial responsibilities: the creation of a national pension scheme providing $30 a month for everyone over seventy years of age; the payment of unemployment assistance to every person out of work who does not draw unemployment insurance benefits; co-operation in the inauguration of a national health insurance plan; assumption of 50 per cent of the cost, with the Provinces, of old-age pensions for needy persons between 65 and 69 years of age; and increase of Provincial subsidies to an irreducible minimum of $12 per caput per annum, based on the 1941 population, with provision for higher grants as gross national production rises. When fully implented, the commitments would, it is estimated, cost $600 millions each year.

An outstanding feature of the plan is the substantial aid it would provide for the promotion of public health work in the Provinces. The present annual health expenditures of $43,000,000 would be increased to more than $300,000,000 when the plan is in full operation—a seven-fold increase in governmental expenditures on public health. The proposals relating to health and health insurance were presented under four headings: (*a*) grant for planning and organizing, (*b*) health insurance, (*c*) health grants, and (*d*) financial assistance for hospitals. It is proposed to give the Provincial Governments an integral part in administering the national health program. As a preliminary step towards the establishment of health insurance, the Federal Government will give grants to the Provincial Governments so that they may establish full-time planning staffs to prepare for and organize health-insurance benefits within their boundaries and train the necessary personnel. The amount of the grant will be $620,000, divided among the Provinces on the basis of $5,000 each plus 5 cents per caput. The Provincial Governments must complete their preliminary preparations for health insurance within eighteen months. Ontario would receive $194,400 for planning and organizing, Quebec $171,600, and the other Provinces in proportion.

The health insurance proposals call for a first stage which would include a general practitioner service, hospital care, and visiting nurse service. Later stages would provide for consultants, specialists and surgical costs, nursing services, dental care, drugs, and laboratory services. The latter benefits may not come into effect for several years. The per caput cost of the first stage is estimated to be $10.20 for the country as a whole, of which the Dominion's share will be $6.12. The per caput cost for the application of the complete health insurance plan will be $21.60, toward which the Federal Government will pay $12.96. If extended to all Canada, the cost of the first stage would be $70,000,000 per annum to the Dominion and about $45,000,000 to the Provincial Governments. The Government states that a complete health insurance service for all the people of Canada "must obviously take a number of years to introduce. The cost to the Federal and the Provincial Governments would depend on the health benefits provided at any given time." It estimates that a full health insurance program, when finally realized, would cost $250,000,000 per annum, of which the Federal Government's share would be $150,000,000.

Adequate local health services are considered of such importance that the provision of public health grants to the Provinces should not await the inauguration of the health insurance plan. In order, therefore, to provide a solid base of public health services on which to build the health insurance program, the Government will provide a number of annual grants to the Provinces, on the following basis:

1. A general health grant of 35 cents per caput to be paid to the Provincial Governments for the development of full-time local health services.
2. A grant not to exceed $3,000,000 annually to assist Provincial Governments in providing free treatment for persons suffering from tuberculosis.
3. A grant not to exceed $4,000,000 to be paid to the Provinces to assist in preventing mental illness, in providing free treatment for persons suffering from mental illness, and for the care and training of mental defectives.
4. A grant not to exceed $500,000 to be paid to the Provinces to assist the Provincial Governments in preventing and controlling venereal disease.
5. A grant not to exceed $500,000 to aid in extending the program for the prevention and treatment of crippling conditions in children.
6. A grant of $250,000 to aid in training personnel for the field of public health.
7. A grant not to exceed $100,000 to encourage research in public health.
8. A grant of $1,243,900 to permit the pensionable age for blind persons to be lowered from 40 to 21 years of age, and to provide for treatment of the blind and of persons suffering from conditions which might lead to blindness. The cost would be divided between the Federal and the Provincial Governments.

The total cost of these grants is estimated at $13,600,900. They would be paid according to agreements concluded between the Provincial Governments and the Dominion. The amounts would be apportioned on a per caput basis and in each case it is expected that the Dominion grant would supplement, and not replace, the Province's own expenditures.

The chief objective of this plan of grants-in-aid is to equalize public health programs by raising standards as much as possible in all parts of the Dominion.

It is recognized that complete health insurance services will require an expansion of hospital facilities. To make their provision less burdensome to the Provinces, it is proposed that the Federal Government shall provide loans for the expansion of hospital facilities to the Provincial Governments that enter into health insurance agreements, and through the Provincial Governments to municipalities and other organizations. The loans will be made at a rate of interest

equal to or slightly above the cost of such loans to the Dominion, and will be repayable out of the health insurance grant, the tuberculosis grant, or the mental health grant, as the case may be. Loans would be made only to those Provincial Governments participating in the health insurance plan.

Participation in the plan will be entirely voluntary. The Provinces will draft their own system of health insurance and institute additional services in any order they desire, but with a definite restriction on the length of time before the total program is in effect.

It is also proposed to inaugurate a system of old-age pensions which would provide for everyone in the country $30 a month upon their attainment of the age of seventy years. The cost is estimated as $200,000,000 in 1948. At the present time, persons over seventy years are paid a pension of $25 a month (contributed in the proportion of 75 per cent by the Dominion Government and 25 per cent by the Provinces), provided the recipient is in need of assistance; the amount is reduced when the private income of a pensioner is in excess of $125 per annum. In addition, the Federal Government proposes to provide old-age assistance for needy persons between 65 and 69 years of age. For people in this age group the Government is prepared to contribute 50 per cent of the cost up to $30 a month. The total cost of this measure in 1948 is estimated at from $34,000,000 to $40,000,000, of which the Federal Government would pay from $17,000,000 to $20,000,000.

Since more than 80 per cent of persons seventy years of age or over are not capable of supporting themselves in remunerative work, the Government believes that national old-age pensions are essential for all. Such pensions would offer economic security and remove the fear of destitution, and would enable those with moderate private savings to retire from active work sooner, or in more comfort, than otherwise would be possible. Removal of the means test would make it possible for the pensions to be administered by the Federal Government alone on a uniform national basis.

It is proposed that as rapidly as possible the Unemployment Insurance Act will be extended to include all employed persons. This will take in farm employees, domestic servants, government employees, and office workers who are now exempt if their wages exceed $2,400 per annum. Farm proprietors will not be included. Accompanying this extension of unemployment insurance, the Government proposes to establish a system of unemployment assistance for able-bodied unemployed persons who have not benefit rights under the Unemployment Insurance Act. This means that the federal authority would assume full responsibility for employable persons out of work. The Provinces would retain their responsibility for unemployable persons classed as indigents. Payments for unemployment assistance would be made by the Treasury and not out of the unemployment insurance fund.

A high degree of accord was reached at the conference, and it is expected that the deliberations will be resumed during the next few months. In the interval, the proposals of the Federal Government will be thoroughly reviewed by the Provincial authorities.

News

British Columbia

FOR THE past two years the Consultant in Nutrition of the Provincial Board of Health has worked closely with the Department of Education in the preparation of nutrition material for the use of teachers throughout the province. In 1943 the emphasis was on school lunches, and in 1944 on general nutrition. In addition, help was given in the planning of a course at the Provincial Normal School in Victoria on the planning and serving of school lunches. The Consultant in Nutrition meets with teachers in her travels throughout the province, and discusses the use of this material in the teaching of health and the organization of school lunch programs.

THE CITY OF ARMSTRONG, in the Northern Okanagan Valley, now has 100 per cent of its milk supply pasteurized. This is the first place in the province to have reached this desired goal.

DEEP X-RAY THERAPY equipment has recently been installed at the British Columbia Cancer Institute in Vancouver. This equipment was bought by the Provincial Government and is on loan to the Cancer Institute.

Saskatchewan

SASKATCHEWAN has simplified provision of free dental care to 25,000 persons for whose health care the Government assumed direct responsibility last January 1. The beneficiaries are old-age and blind pensioners and their dependents and the parents and children who received mothers' allowances. From April 1 the Province has paid for dental service to those who were referred by physicians because their health was being or might be impaired by dental conditions. Under a new regulation, patients may go directly to dentists, who will determine whether or not work is needed and obtain authorization directly from the Medical Services Division, Department of Public Health.

TO ENCOURAGE RECRUITMENT and training of nurses and thereby alleviate the acute shortage of trained nurses, the Saskatchewan Government has undertaken to reimburse existing training schools in the province which enlarge their registration beyond the needs of affiliated hospitals. The Government will pay for additional accommodation and teaching staff which the training schools may need. It will also pay travelling expenses if an affiliation plan for smaller hospitals without training schools can be arranged. It is proposed to send pupil nurses to such hospitals for short periods, thereby giving them valuable training and also relieving the personnel shortage at such hospitals. The proposals were agreed upon at a meeting of the Department of Public Health, The Saskatchewan Health Services Planning Commission, and the Saskatchewan Registered Nurses Association.

AFTER AN ABSENCE from the summer fairs for several years, the Saskatchewan Department of Public Health this season is showing three exhibits, one on venereal-disease control, one on nutrition, and one on cleanliness in public eating-places. The first two mentioned are being shown at "Class A" and "Class B" agricultural exhibitions, which annually draw hundreds of thousands of visitors. The nutrition display demonstrates adequate meals under glass, and particularly emphasizes the importance of a good lunch for school children. The theme of the exhibit is "Meal Planning."

Adequate school lunches are part of the program of sixteen larger school administrative units set up in Saskatchewan since last autumn. Two cities have taken definite steps to assure that children eat adequate lunches.

THE DIVISION OF PHYSICAL FITNESS AND RECREATION has provided for 200 scholarships, each worth $25, for students in physical education, art, drama, music and crafts, at the University of Saskatchewan summer school. One hundred and thirty-three students, nearly all teachers, are registered in the physical education classes. Dr. J. B. Kirkpatrick, Provincial Director of Physical Fitness, is directing the physical education classes and is assisted by several members of the division. Community and church leadership courses in physical education and recreation are being planned for the autumn.

MEDICAL CARE GRANTS to municipalities to assist them to engage physicians and supply

their residents with adequate general medical service have been payable in Saskatchewan since July 1. One grant is a flat per caput grant of 25 cents; the other is an equalization grant of up to $2.00, the largest amounts going to municipalities with the lowest assessments.

The grants are conditional on certain standards being met, among them a new model contract providing a minimum of $5,000 per year for general medical service on the basis of a population of 2,000 persons. Annual holidays with pay and bi-annual leave for post-graduate study are requirements. Municipalities and doctors are left free to arrange the way in which physicians are to be paid. Payment may be on a fee-for-service basis, on a per caput basis, or straight salary.

Manitoba

CITIZEN ORGANIZATIONS throughout Manitoba are showing a keen interest in the Manitoba Health Plan. Realizing that an informed public is the secret of successful legislation, the Department of Health and Public Welfare is making speakers and information about the Plan available to all interested groups. Miss Margaret E. Nix, Director of Health and Welfare Education, was invited to attend all the district conventions of the Manitoba Federation of Agriculture during June. In this way, key people from every district of the province were contacted about the Plan. The Hon. Ivan Schultz (Minister of Health and Public Welfare) and Miss Nix addressed the annual convention of the Women's Institute. This was followed by addresses by Miss Nix to three district conventions of the Women's Institute. As a result of these and other meetings, requests for speakers to attend local meetings of the M.F.A., W.I., and other groups are increasing rapidly.

A CAMPAIGN for the erection of rural medical and nursing units (six-bed) as memorial centres has been sponsored by Manitoba Pool Elevators Ltd. These centres would serve as obstetrical and medical units in districts served by one doctor. For this campaign, an attractively illustrated booklet, "The Rural Health Centre—A Living Memorial," has been prepared by Manitoba Pool Elevators in co-operation with the Department of Health and Public Welfare. A copy of the booklet can be obtained by addressing the Bureau of Health and Welfare Education, 320 Sherbrook Street, Winnipeg.

MARGARET J. VANN, Nutrition Consultant, Manitoba Department of Health and Public Welfare, represented Manitoba at the meetings of the Canadian Council on Nutrition held in Ottawa on June 8th and 9th. In addition, Mrs. Vann attended the All-Canadian Nutrition Conference conducted by the Nutrition Division of the Department of National Health and Welfare, and did some field work in Toronto with the School of Hygiene, Visiting Homemakers Association, Canadian Red Cross Society, Toronto Department of Public Health, and other agencies.

MISS MARY ELIZABETH RING has been appointed Health Educator at the Provincial Normal School. Miss Ring is a nursing graduate of Fall River, Mass., and has done post-graduate work at various universities in the U.S.A., including a recent course in public health at the University of North Carolina. A public health nurse in the Manitoba Department of Health and Public Welfare since 1927, she has been with the Bureau of Health and Welfare Education since 1938.

PAUL L'HEUREUX, B.A., M.D., D.P.H., has been appointed Director of the Bureau of Local Health Services in the Department of Health and Public Welfare. Dr. L'Heureux, who is a graduate of the Manitoba Medical College, took the post-graduate course leading to the Diploma in Public Health at the School of Hygiene, University of Toronto, in 1940. Since that time he has been Medical Director of the St. Boniface Health Unit. His experience includes rural practice for some years at Lorette, Manitoba. Dr. L'Heureux's new duties will place particular emphasis on the organization of full-time health units to serve the rural areas of Manitoba.

Abstracts

Venereal Disease in the Soviet Union

VENEREAL disease has been vigorously attacked in the Soviet Union and with extremely gratifying results. From the very high estimated rate of 338 cases of syphilis per 10,000 of the population in 1913 in Moscow, the incidence was reduced to 34.8 by 1932 and has since been further reduced to where primary syphilis is a rarity. Apparently the Armed Forces of the U.S.S.R. have been virtually free of venereal disease. This result has been achieved by organized effort dating back to 1918, when a special Bureau for Venereal Diseases of the People's Commissariat of Public Health was established. In the following year the Bronner Institute for Skin and Venereal Diseases was established in Moscow and since then a large number of doctors have received postgraduate courses.

The whole country is provided for with dispensaries ranging from large well-equipped institutions to small simple units and for outlying areas mobile units or flying squads. Each dispensary is staffed according to the population it serves, and in addition to active search for cases and control of sources of infection a broad program of education is carried on among the people. Antenatal Wasserman tests are routine. Legal enactments provide for secrecy and compulsory treatment and penalties are provided for exposing others to infection. Emphasis is placed on examination of contacts and it is estimated that 50 to 60 per cent of contacts are traced. Of equal importance to the above measures has been the attention to elimination of prostitution. This problem has been solved by raising the economic level of the population, abolishment of unemployment, the encouragement of early marriage, and re-education of prostitutes.

A lengthy and interesting introduction to this article gives information on the governmental system of the U.S.S.R. health programs and medical organization and education.

J. A. Scott, Brit. J. Ven. Dis., 1945, **21**:2.

Tuberculin Patch Test

DISAPPOINTMENT with the results of patch tests in tuberculous cases led to the development and trial of a modified patch test described in this article. The modification consisted simply of making one or two horizontal or vertical scratches 1/8 to 1/4 inch in length in the ether-cleansed areas where the test and control patches were to contact the skin. This method, resembling the original Pirquet's principle, and the regular patch test, applied in an immediately adjacent area, were compared on 229 patients.

In one group of 114 children with tuberculous lesions 93 per cent were positive to the modified patch test and only 54.4 per cent to the unaltered patch. In a second group all of 14 allergic children without lesions were positive to the modified patch test but only 5 to the patch test. In a normal group of 101 children both tests were consistently negative though there were 4 definite contacts in the group.

The greatest failure of the unaltered patch test in the first group was among the older children while the modified test showed no variation attributable to age. This suggests that differences in texture of skin have an important bearing on absorption of tuberculin. In only 1 case was the modified patch test negative when the regular patch test was positive. By ensuring better absorption of tuberculin the modified test becomes a more sensitive detector of allergic reactors.

William Candib, Pub. Health, 1945, **58**:91.

Oral Administration to Volunteers of Fæces from Patients with Homologous Serum Hepatitis and Infectious (Epidemic) Hepatitis

FAECES samples were collected from patients with homologous serum hepatitis during the icteric and pre-icteric stages of the disease and from cases of infectious (epidemic) hepatitis in various stages of the disease—pre-icteric, icteric and post-icteric. Suitable pools of these materials were prepared in the laboratory for oral administration to human volunteers in order to determine the elimination of the virus in the

two conditions as well as the period of infectivity.

Volunteers fed the pools from homologous serum hepatitis cases were observed for 4 to 10 months and none developed evidence of hepatitis. This would suggest that the virus of this form of hepatitis is not excreted in the fæces or is inactive when introduced via the gastro-intestinal tract. Pooled material from infectious hepatitis produced the disease in 7 of 19 volunteers with an incubation period of 20-26 days. Similar material taken from patients 3 weeks after the disappearance of jaundice failed to cause disease when fed to 7 volunteers. These results indicate that the virus is excreted in the fæces in the active stage of infectious hepatitis but is not present 3 weeks after the disappearance of icterus.

John R. Neefe, Joseph Stokes, Jr., and John G Reinhold, Am. J. Med. Sci., 1945, **210**:*29*

Rickets in Iceland

RICKETS rarely occurs in extreme form in Iceland, and this has led to the mistaken belief that the condition is unknown in the country. That this is far from the case is shown by the present survey, in which 253 children from three months to two years of age were examined. Definite signs of rickets were shown by clinical examination alone in 66 per cent and by X-ray alone in 75 per cent. On the results of both examinations the incidence of rickets was 77 per cent. The cranial bones and ribs were most commonly affected. While many of the children received cod-liver oil, the dosage was inadequate in most cases, less than half that considered necessary. Some children had received artificial irradiation and in these the incidence of rickets was considerably lower. Either form of prophylaxis in adequate amount is particularly necessary in Iceland because of the long, dark winter.

Niels Dungal, Am. J. Med. Sci , 1945, **210**:*70.*

Nontuberculosis Pulmonary Calcification and Sensitivity to Histoplasmin

PULMONARY calcification has generally been regarded as evidence of healed tuberculosis. However, the distribution of tuberculosis and the frequency of calcification do not correlate closely and where high rates of calcification occur, as in the central eastern half of the United States, the lesions are found commonly in the tuberculin-negative persons. Accordingly, other explanations of the condition have been sought and among those put forward have been ascariasis, coccidioidomycosis, and more recently histoplasmosis or some closely related infection. In support of the last two is their high endemicity in certain areas with a marked occurrence of pulmonary calcification in tuberculin-negative persons.

In order to test the possibility that infection with *Histoplasma capsulatum* or some closely related organism is a cause of pulmonary calcification, 3,105 student nurses were given intradermal tests with tuberculin and histoplasmin and chest X-rays taken. Positive reactions to histoplasmin occurred in 22.9 per cent with, however, a range of from approximately 5 per cent in Minneapolis to 60 per cent in Kansas City, Mo. It would appear, therefore, that in certain areas of the United States infection with histoplasma is very common in a mild or subclinical form.

Pulmonary calcification was found in 294 of the nurses. Of these 21.4 per cent were tuberculin-positive and 79.3 per cent were histoplasmin-positive, while 11.9 per cent were positive to both and only 8.5 per cent were negative to both.

Among the total group of 3,105 nurses the association with pulmonary calcification in those who reacted to tuberculin only and histoplasmin only was 10.4 and 31.1 per cent respectively. Of those who were negative to both tests, pulmonary calcification was present in only 1.2 per cent. It was evident that a high rate of pulmonary calcification and a high incidence of reaction to histoplasmin occurred, in general, in the same States. Assuming the specificity of the histoplasmin reaction for which only indirect evidence is yet available, it would appear that histoplasmosis accounts for a high proportion of the pulmonary calcifications in tuberculin-negative persons.

Carroll E. Palmer, Pub. Health Rep., 1945, 60: *513.*